MORITA

Dental root canal measurement and treatment unit

ROOT ZX III

Low Speed Handpiece Module

Operation Instructions

* Low Speed Handpiece Module must be connected to Canal Measurement Module, which is sold separately. This unit cannot be used as an independent unit.

This manual is for Low Speed Handpiece Module.
To measure a root canal refer to the manual for Canal Measurement Module.

USP. 5980248	KOREA PAT. 159070
USP. 5897315	JAPAN PAT. 2873722
USP. 5902105	JAPAN PAT. 2873725
USP. 5096419	JAPAN PAT. 3071245
USP. 5211556	JAPAN PAT. 3071270
USP. 5295833	JAPAN PAT. 3113109
DBP. PAT. 4126753	JAPAN PAT. 3113095
DBP. PAT. 4139424	JAPAN PAT. 3213484
DBP. PAT. 4232487	

Manufactured by J. MORITA MFG. CORP.

Thank you for purchasing ROOT ZX II Low Speed Handpiece Module.
For optimum safety and performance, read this manual thoroughly before using the unit and pay close attention to warnings and notes. Keep this manual in a readily accessible place for quick and easy reference. This manual contains essential safety information.

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1. Prevent Accidents

Most operation and maintenance problems result from insufficient attention being paid to basic safety precautions and not being able to foresee the possibilities of accidents.
Problems and accidents are best avoided by foreseeing the possibility of danger and operating the unit in accordance with the manufacturer's recommendations.

Note the meaning of the following symbols and expressions:

⚠ **WARNING**	This warns that it may result serious injury of the patient or operator if the instructions are not followed properly.
⚠ **PROHIBITION**	The user can not use in such a way that may result in serious injury of the patient or operator.
⚠ **NOTE**	This alerts the user to the possibility of damage to the equipment, potential injury of the patient or operator, or important points concerning operation and performance.

The user (e.g. the hospital, clinic etc.) is the party responsible for the maintenance and proper operation of ROOT ZX II Low Speed Handpiece Module.
ROOT ZX II Low Speed Handpiece Module must only be operated by dentists and other legally licensed professionals.

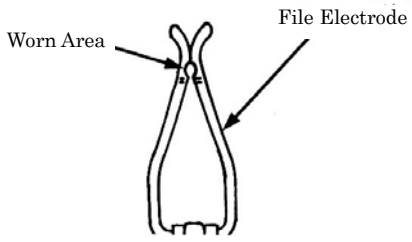
Do not use this equipment for anything other than its specified purpose.

⚠ WARNING

- *This unit must not be connected to or used in combination with any other apparatus or system. It must not be used as an integral component of any other apparatus or system. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, bodily injury or any other trouble which results from ignoring this prohibition.*
- *Do not injure your fingers when inserting or removing files.*
- *Do not use damaged file holders; an accurate measurement can not be made with a damaged file holder.*
- *When continuous tone is heard while the main power switch is on and without any operation, some electrical part may be malfunction. Do not use the unit and send the unit to J. Morita office for repairing.*
- *This unit is for prescription use only.*
- *A rubber dam should be used when performing endodontic treatment.*
- *Caution: US Federal law restricts this unit to sale by or on the order of a dentist in U.S.A.*
- *Do not use the unit when the AC adapter is connected. (see page 7, 22)*
- *Never operate the unit with an external power supply. (see page 7, 23)*
- *If an electrical storm occurs while the battery is being charged, do not touch the AC adapter or the charger's power supply cord as there would be a risk receiving an electric shock. (see page 7, 23)*
- *After attaching contra angle to the micromotor, give the micromotor a light tug to confirm it is securely attached. (see page 8)*
- *After attaching the micromotor to handpiece cord, give the micromotor a light tug to confirm it is securely attached. (see page 8)*
- *Plastic sleeves must be replaced after each patient. (see page 8)*
- *Never use stretched, deformed or damaged files. (see page 9)*
- *Give the file a light tug to confirm it is securely held in place. If the file is not securely placed, it could come out and injure the patient. (see page 9)*
- *Take care to avoid the risk of a file being swallowed by the patient. (see page 9)*
- *Check the unit's operation before each patient. If the indicators in the display do not appear normally, the unit may not be able to make an accurate measurement. In this case, stop using the unit and have it repaired. (see page 10)*
- *When measuring the length of a root canal, make sure that the file electrode does not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock. (see page 12)*
- *Before measuring length of a root canal, make sure that the rotation speed does not appear on the display. If the rotation speed appears on the display, the unit is set for root canal preparation mode, and the handpiece will operate. (see page 12)*
- *When shaping a root canal, make sure that the file or contrary electrode does not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock. (see page 13)*
- *Check the settings on the display after selecting memories. (see page 14)*
- *In some cases such as a blocked root canal, a measurement can not be made.(see page 16)*
- *Accurate measurement is not always possible, especially in cases of abnormal or unusual root canal morphology; make sure to take an x-ray to check the measurement results. (see page 16)*
- *Stop using the unit immediately if it does not seem to be working properly. (see page 16)*
- *If the motor overheats, remove the micromotor from the patient's mouth, wait until it cools down to resume treatment. (see page 18)*
- *Electric noise could cause malfunction of the unit. Do not depend entirely on the unit controlling itself; always watch the display, listen to the sound and be aware of tactile feedback. (see page 19)*

⚠ WARNING

- *Accurate measurement is not always possible depending on the root canal condition. Make sure to take an x-ray to check the results. Also Nickel-Titanium files can sometimes wear out rather quickly depending on the shape and the degree of curvature of the root canal. Stop using the unit immediately if it does not seem to be working properly. (see page 19)*
- *When shaping and cleaning a root canal, make sure that the file or contrary electrode does not come in contact with an electrical power source such as an electrical socket. This could result in a severe electrical shock. (see page 19)*
- *Nickel-Titanium files are more easily broken than stainless steel files by the amount of torque applied to them. Do not try to force the file down the root canal. Also do not use these files for the root canals that have a relatively sharp curve near the apical foramen. (see page 19)*
- *Nickel-Titanium files will eventually break due to metal fatigue and should be replaced before they reach this point. (see page 19)*
- *Always examine files for separation and other deformities or damage before using them. Any type of deformity could result in the file breaking. (see page 19)*
- *If the file touches the oral mucosa or a tooth, it will automatically start to rotate and could injure the patient. (see page 19)*
- *Do not touch the oral mucosa with the metal part at the end of the contra angle. This could result in injuring the patient. (see page 19)*
- *If the contra angle's file release button is pressed against the teeth opposite the one being treated, the file could come out and injure the patient. (see page 19)*
- *Never press the file release button while the micromotor is running. This could cause the button to heat up and burn the patient or the file to come out and injure the patient. (see page 19)*
- *Be careful when using the foot switch; the motor may rotate regardless of the measurement results. (see page 20)*
- *If [F.02] appears in the display, noise has been detected. Turn the unit off and then back on again. If [F.02] still appears, stop using the unit and contact your local dealer or the J. Morita regional office. (see page 22)*
- *Autoclave the contra angle after each patient. (see page 24)*

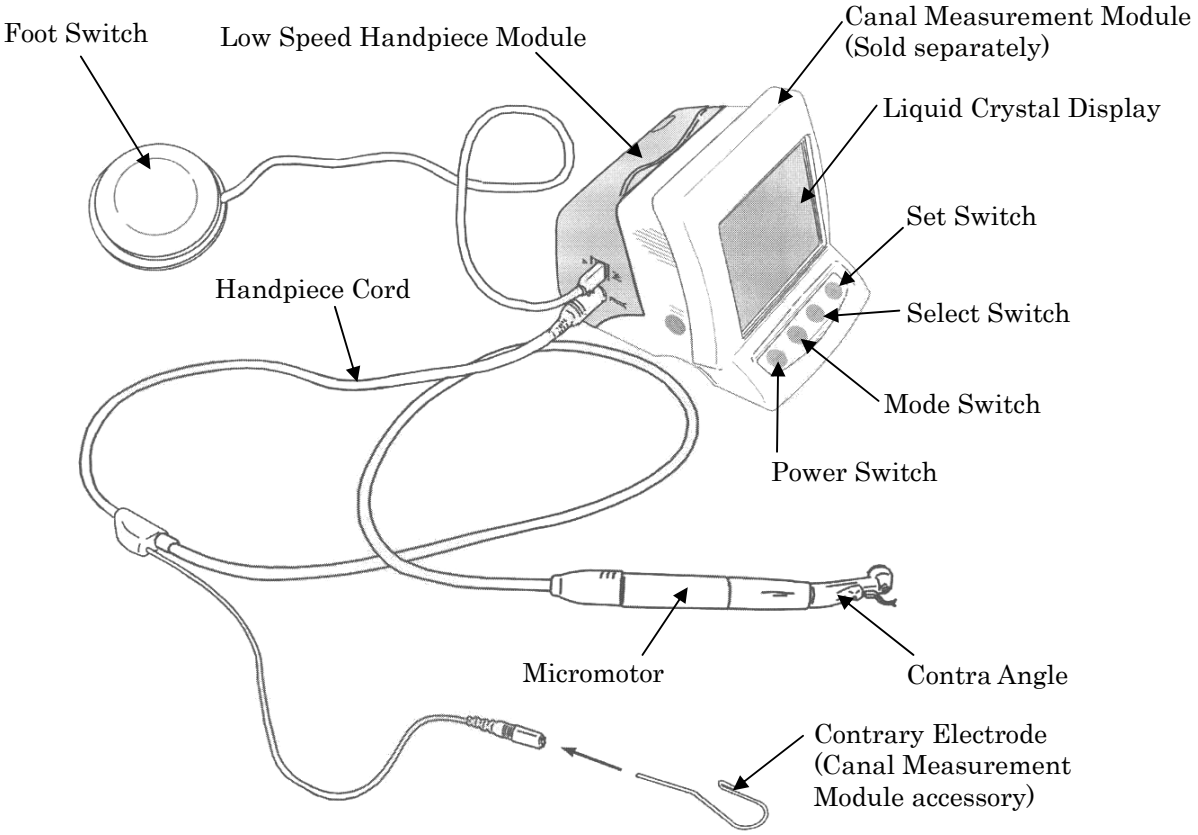


- *Replace the file electrode when it is worn to the extent indicated in the illustration. It could break if used after reaching this point. (see page 26)*

⚠ PROHIBITION

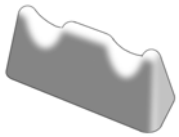
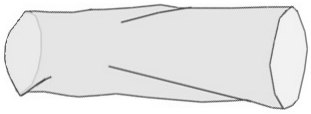
- *Do not use this unit in conjunction with an electric scalpel or on patients who have a pacemaker.*
- *Do not use this unit in the medical operation room.*
- *Blocked canals cannot be accurately measured.*
- *This unit must not be connected to or used in combination with any other apparatus or system. It must not be used as an integral component of any other apparatus or system. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, bodily injury or any other trouble which results from ignoring this prohibition.*
- *Illumination devices such as fluorescent lights and the Film viewer which use an inverter can cause ROOT ZX II to operate erratically. Do not use ROOT ZX II near devices such as these.*
- *Electromagnetic wave interference could cause this unit to operate in an abnormal, random and possibly dangerous manner. Cellular phone, transceivers, remote controls and all other devices which transmit electromagnetic waves located inside the building should be turned off.*

2. Parts Identification

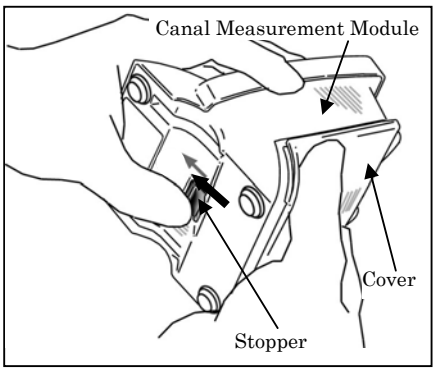


* Low Speed Handpiece Module must be connected to Canal Measurement Module.
* Low Speed Handpiece Module cannot be used as an independent unit.
* In this manual, root canal measurement unit is called Canal Measurement Module and root canal treatment unit is called Low Speed Handpiece Module.

Accessories

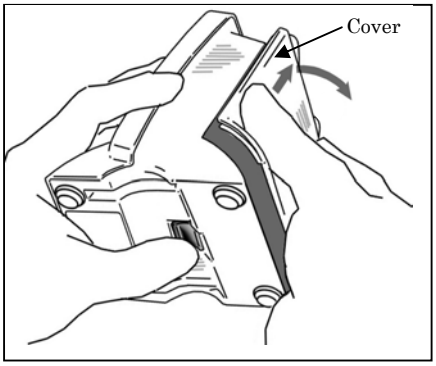
Micromotor (1)	Contra Angle (1)	Handpiece Cord (1)
TR800-Blue Line TR400-Green Line (Option) 		
Handpiece Rest (1)	**AR Oil (1)**	**AC Adapter (1)**
		
Battery (1)	**Foot Switch (1)**	**Plastic Sleeve (20)**
 (Pre-installed)		

3. Assembling the Unit



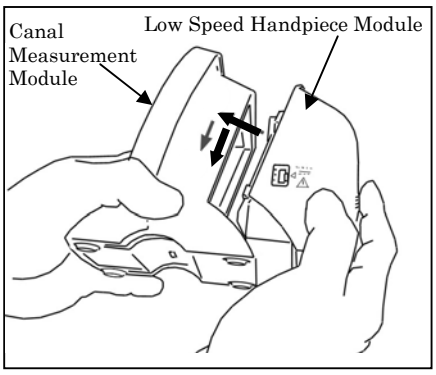
Attaching Low Speed Handpiece Module to Canal Measurement Module

1. Hold the cover and slide the stopper on the bottom towards the liquid crystal display.



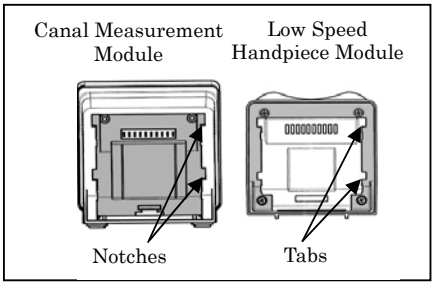
2. Slide the cover in the direction indicated by the arrow in the illustration and remove it from Canal Measurement Module .

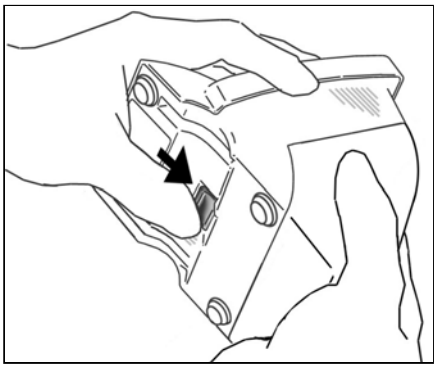
* The cover and batteries will not be used.



3. Line up the tabs on Low Speed Handpiece Module with the notches in Canal Measurement Module and put them together.

4. Slide Low Speed Handpiece Module all the way down until it is securely attached.



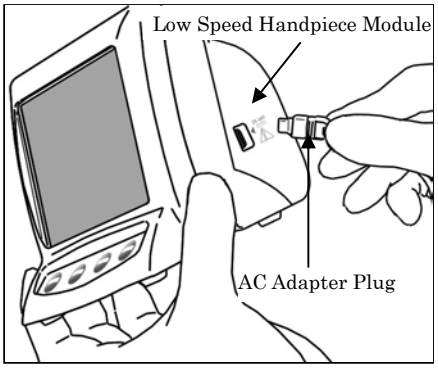


⚠ **NOTE**

- ***If the catch on the bottom is not back in its original place after attachment, push it in the direction shown by the arrow in the illustration.***
- ***After installation, give Low Speed Handpiece Module a light tug to confirm it is securely attached.***

Charging Battery

The battery is built into Low Speed Handpiece Module.



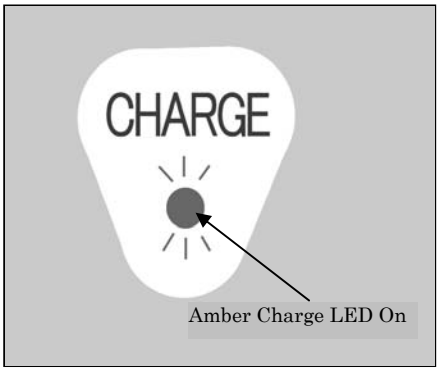
⚠ NOTE

- *The battery is not charged when the unit is shipped from the factory and must be charged before using the unit.*
- *If the plug for the AC adapter does not fit the socket, it is the user's responsibility to find a suitable plug adapter.*

1. Line up the arrow (➡) on the AC adapter's connector with the triangle (◀) above its jack on the left side of Low Speed Handpiece Module and plug it in. Then plug the adapter into the electrical power receptacle.

⚠ WARNING

- *Do not use the unit when the AC adapter is connected.*



2. The Amber Charge LED on the back of Low Speed Handpiece Module starts flashing on and off and then, after a few seconds, it will stop flashing and stay on to show that the battery is being charged. It takes about 60 minutes to fully charge the battery.
3. Amber Charge LED goes out when the battery is fully charged.
4. Disconnect the AC adapter from Low Speed Handpiece Module and unplug it.

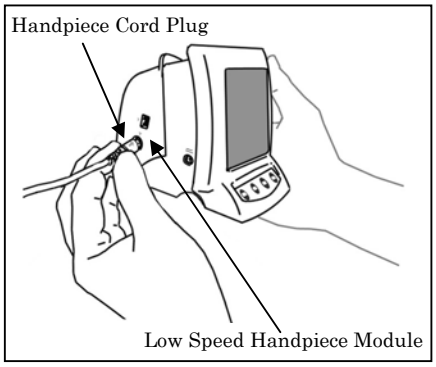
⚠ WARNING

- *Never operate the unit with an external power supply.*
- *If an electrical storm occurs while the battery is being charged, do not touch the AC adapter or the charger's power supply cord as there would be a risk receiving an electric shock.*

⚠ NOTE

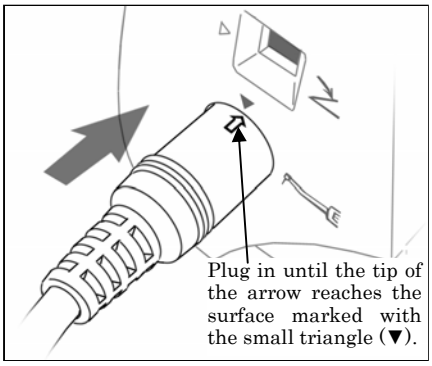
- *Do not pull or yank the cord when disconnecting the AC adapter.*

4. Before Using the Unit



Assembling Micromotor

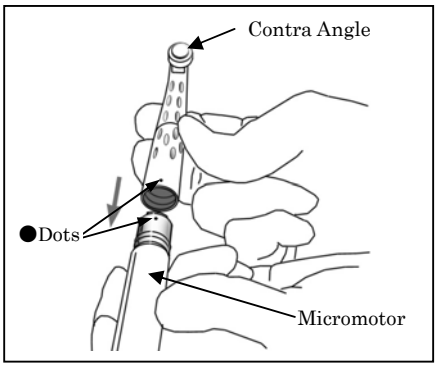
* Contra angle must be lubricated with AR Oil before using for the first time. Refer to "Lubricating the Contra Angle" on page 25.



1. Line up the arrow (⇨) on the handpiece cord connector with the triangle (▼) above its jack on the left side of Low Speed Handpiece Module and plug it in.

⚠ NOTE

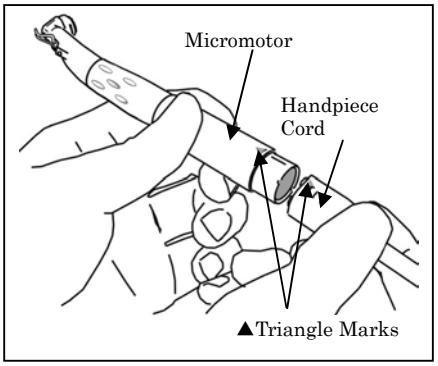
- ***Handle Low Speed Handpiece Module carefully; do not drop, bump or expose it to other kinds of impacts or shocks. Rough handling could cause damage.***
- ***Make sure the plug is securely plugged into the jack. A poor connection can cause malfunction.***
- ***Do not drop anything on or bang the plug after it has been inserted into the jack.***



2. Line up the dots on the micromotor and contra angle and slide the contra angle straight onto the micromotor until it clicks securely into place. The contra angle has a simple snap-on connection.

⚠ WARNING

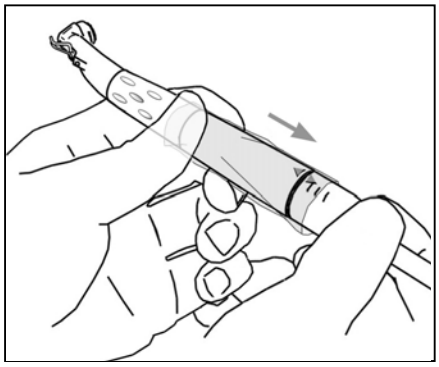
- ***After attaching contra angle to the micromotor, give the micromotor a light tug to confirm it is securely attached.***



3. Line up the triangle (▼) to connect the micromotor to handpiece cord.

⚠ WARNING

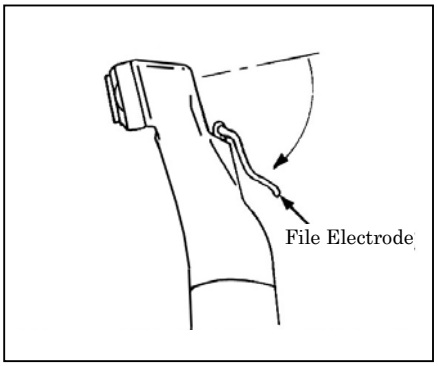
- ***After attaching the micromotor to handpiece cord, give the micromotor a light tug to confirm it is securely attached.***



4. Put a plastic sleeve on the micromotor portion.

⚠ WARNING

- ***Plastic sleeves must be replaced after each patient.***



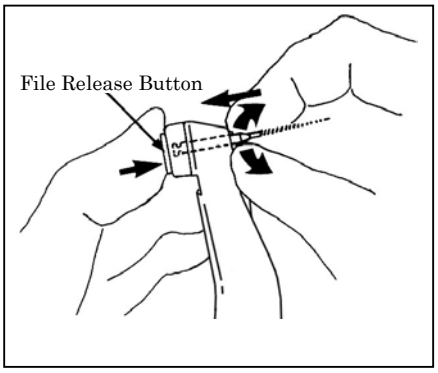
Assembling File and File Electrode

Use only nickel-titanium files for root canal preparation.

⚠ WARNING

- *Never use stretched, deformed or damaged files.*

1. Gently pull back the file electrode.



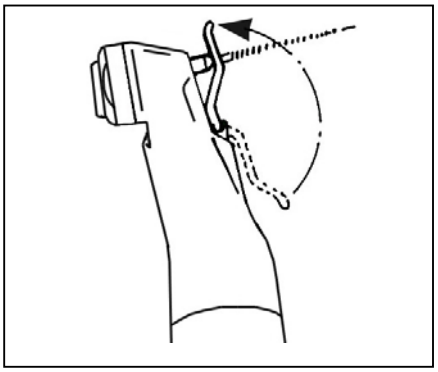
2. Hold down the file release button on the contra angle and insert the file. Turn the file back and forth until it is lined up with interior latch groove and slips into place. Release the button to lock the file into the contra angle.

⚠ WARNING

- *Give the file a light tug to confirm it is securely held in place. If the file is not securely placed, it could come out and injure the patient.*
- *Take care to avoid the risk of a file being swallowed by the patient.*

⚠ NOTE

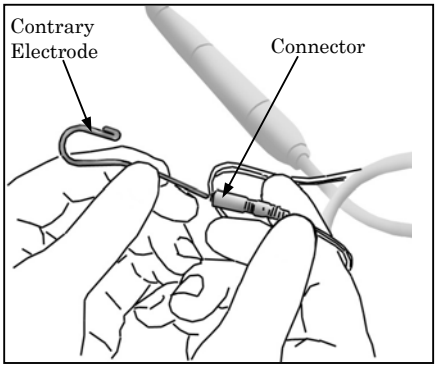
- *Use caution when inserting and removing files to avoid injury to fingers.*
- *Inserting and removing files without holding the file release button may damage the chuck.*
- *Do not attach the file electrode to files with a shaft diameter of 1.2mm or greater, or large shafted tools such as Largo bur. The file electrode cannot be attached to files and Gates-Glidden reamers that do not have circular shafts. Set the unit for manual mode when using these types of instruments.*



3. Gently clip the file electrode securely onto the file.

⚠ NOTE

- *Do not clip the file electrode to the cutting part of the file.*
- *The file electrode cannot be attached onto some files.*

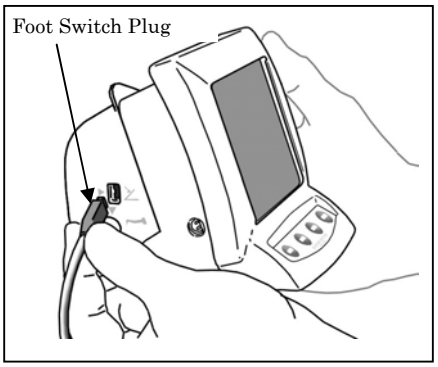


Attaching Contrary Electrode

Insert the contrary electrode (lip clip) into the connector of the handpiece cord. (The contrary electrode is an accessory provided with Canal Measurement Module.)

⚠ NOTE

- *Always hold the connector to connect or disconnect cords.*

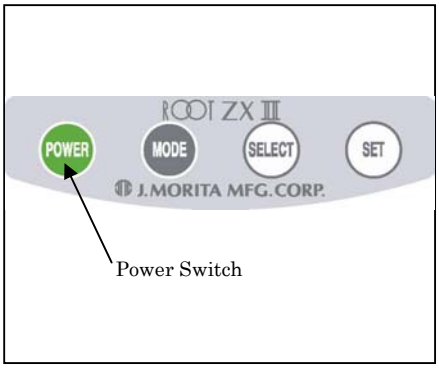


Attaching Foot Switch

Insert the foot switch plug all the way into its jack on the left side of Low Speed Handpiece Module. [This jack is marked with a triangle (▲) pointing up.]

⚠ NOTE

- ***Always hold the connector to connect or disconnect cords.***

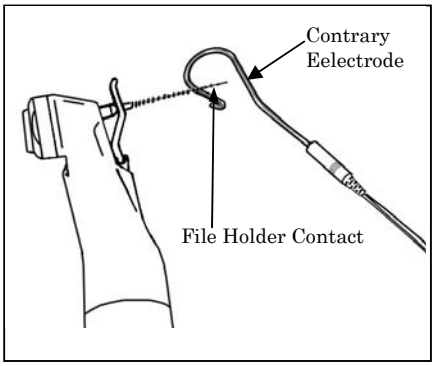


Checking the Function

1. Press the Power switch to turn the unit on. Display used for root canal preparation will appear.

* The unit will automatically turn off after 5 minutes of non-use.

2. Check that the handpiece cord is properly plugged into the jack.
3. Check that the contra angle is securely attached to the micromotor.
4. Check that the file is properly installed. Give it a light tug to confirm.
5. Check that the file electrode is properly clipped onto the file.



6. Check that the contrary electrode is attached to the connector of the handpiece cord.
7. Contact the file with contrary electrode and check that all the canal length indicator bars on the display are lit, the word "APEX" flashes and audible beep becomes continuous. Use caution when contacting the file with contrary electrode as the file starts to rotate as soon as the file touches the contrary electrode.

⚠ WARNING

- ***Check the unit's operation before each patient. If the indicators in the display do not appear normally, the unit may not be able to make an accurate measurement. In this case, stop using the unit and have it repaired.***

5. Operating the Unit

Overview of Features and Functions

The combination of Low Speed Handpiece Module with Canal Measurement Module allows the micromotor to be controlled in a variety of ways. The root canal can be prepared with great precision and delicacy.

* File Rotation Speed
  9 speeds setting from 0 rpm to 800 rpm can be selected.

* Auto Start and Stop
  The file automatically starts to rotate when it is inserted into a root canal and stops when it is removed.

* Auto Apical Reverse and Auto Apical Stop
  The file either reverses its rotation or stops when the file tip reaches the Apical Line.

* Auto Torque Reverse
  The file automatically reverses its rotation when the torque load reaches a specified preset value.

  Torque Setting for Auto Torque Reverse
  There are 11 settings available for the value of the torque that will trigger the Auto Torque Reverse function. The Auto Torque Reverse function can also be turned off. Please refer the chart on the right.

  ***** ***These torque values vary somewhat depending on the condition of the micromotor and the gears.***

Torque Line	Torque (g·cm) Approx.	Torque (N·cm) Approx.
1	30	0.3
2	60	0.6
3	90	0.9
4	120	1.2
5	150	1.5
6	180	1.8
7	250	2.5
8	300	3.0
9	350	3.4
10	400	3.9
11	500	4.9
ALL	OFF	OFF

* Setting the torque line level 10 or 11 could result in the file engaging in the canal wall and locking up.

* Auto Apical Slow Down
  The file automatically slows down as it approaches the apex so that the region near the apical foramen can be treated with a slow gentle rotation. This function can also be turned off. The rate at which the file slows down depends on the speed setting. The chart below shows how the file slows down when the speed is set for 800 rpm.

Position of file tip	RPM
Beyond Apex	150
Apex – 0.5	200
0.5 – 1.0	250
1.0 – 1.5	300
1.5 – 2.0	400
2.0 – 2.5	500
2.5 – 3.0	600
3.0	800

* Setting Stopping Time before the File Reverses
  When Auto Apical Reverse function is triggered, the interval between the file stopping rotation and reversing can be set.
* Adjustable Sound Volume
  Volume of audible signal can be adjusted.
* The unit will automatically go into the root canal measurement mode if it detects any abnormality such as the one caused by electrical noise. However, it will return to the normal mode when the file is taken out of the root canal.

Easy Operation

Press the Power switch to turn the unit on and press the Mode switch to select any one of three memories.
Each memory can be set for different motor control parameters. The desired set of parameters can be easily selected by pressing Mode switch button.

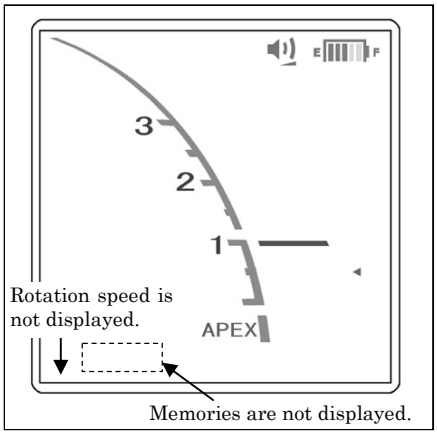
Manual Operation

Foot switch allows the file to rotate outside the root canal. The file can rotate manually even without the foot switch when the unit is set in manual mode. The file rotation can also be reversed manually when the file is engaged too deeply in the root canal. (Use caution when using this function as the file reverses at a considerable rate of speed and torque.)

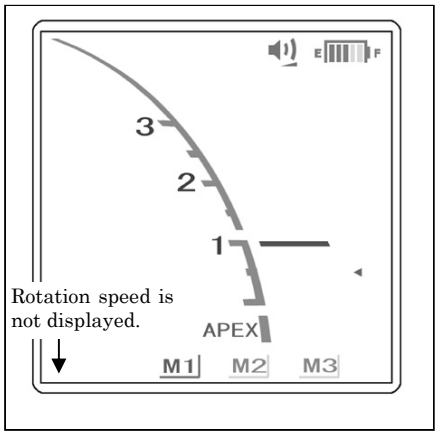
Root Canal Measurement (Two Methods)

Plug the probe cord into Canal Measurement Module and connect the file holder and contrary electrode.

Probe Cord Plug



1. Leaving the micromotor connected and press the Mode switch until the speed and memory displays disappear. (Refer to the operation manual for Canal Measurement Module.)



2. Detach the micromotor from handpiece cord. Select M1, M2 or M3 with pressing the Mode switch and measure length of a root canal. (Refer to the operation manual for Canal Measurement Module.)

⚠ WARNING

- *When measuring the length of a root canal, make sure that the file electrode does not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock.*
- *Before measuring length of a root canal, make sure that the rotation speed does not appear on the display. If the rotation speed appears on the display, the unit is set for root canal preparation mode, and the handpiece will operate.*

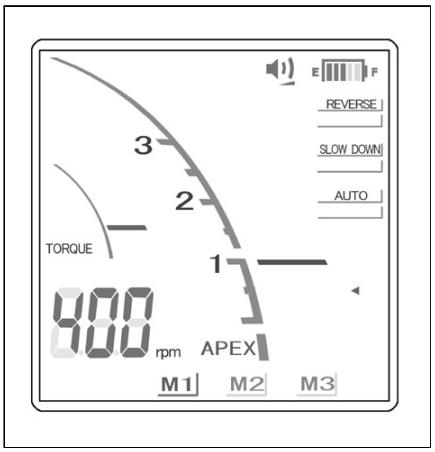
⚠ NOTE

- *It is best to disconnect the handpiece when measuring the root canal.*
- *Remove the file from the micromotor when taking a measurement.*

Shaping the Root Canal

Plug the handpiece cord into Low Speed Handpiece Module and then connect the handpiece and the contra angle.

Handpiece Cord Plug



Press the Mode switch to select M1, M2, or M3, and then perform root canal shaping.

⚠ WARNING

- *When shaping a root canal, make sure that the file or contrary electrode does not come into contact with an electric power source such as an electrical socket. This could result in a severe electrical shock.*

⚠ NOTE

- *Make sure to remove a file from the micromotor after completing root canal preparation.*

Liquid Crystal Display and Switches

Motor Stopping Time for Apical Reverse

0, 0.25, 0.5, and 1 second
The file rotation stops for the specified period before it reverses.

Apical Reverse or Stop Control

Set the unit to reverse its rotation or stop when the file tip reaches the position specified by the Apical Line.

Torque Line

11 settings for auto torque reverse.
This function may be turned off.

The motor automatically reverses if the torque exceeds the specified limit. Refer to the ⚠ **NOTE** concerning the torque setting on the right side of this page.
If all torque lines are lit up, the reverse torque function is turned off.

⚠ **NOTE**

- ***If all the torque lines are lit up, the motor will not reverse itself no matter how much torque is applied. In this case, make sure that the file is not engaged in the canal or it will break.***

Canal Length Indicator Bar

Sound Volume

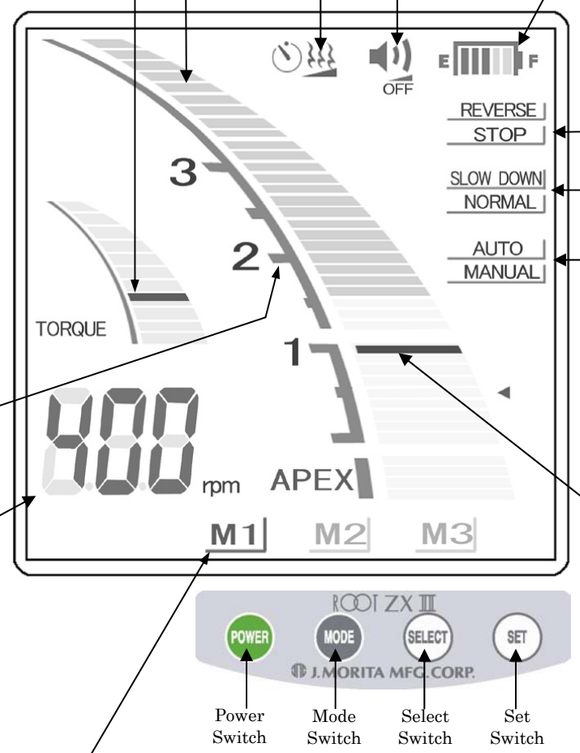
Off, Low and High

Battery Power Indicator

This bar graph shows how much battery power is left. Charge the battery as soon as this graph starts flashing on and off.

⚠ **NOTE**

- ***Never use the unit when the battery power display is flashing. The motor will not operate when this display is flashing.***



Meter Gauge

* The numerals 1, 2, and 3 do not represent length in millimeters.

Manual Mode

Use the manual mode to operate the unit outside the canal.

(See page 21 for details.)

Rotation Speed

Speed is set for 0, 150, 200, 250, 300, 400, 500, 600 and 800 rpm. Refer to "Setting and Changing Memory" on the right side of this page.

⚠ **NOTE**

- ***Make sure the speed is not displayed when measuring the length of the root canal.***

Power Switch | Mode Switch | Select Switch | Set Switch

File Rotation Controls near the Apical Foramen

Slow Down : File rotation slows down as it approaches the apical foramen for safe treatment.

Normal : File rotates at specified speed even near the apical foramen.

* Reverse rotation speed is the same as forward rotation speed except when forward rotation is set for the maximum, in which case, the reverse speed is one level slower than the forward speed.

Memory (M1, M2, and M3)

Refer to the section "Setting and Changing Memory" for details.

* These are not displayed when measuring root canal with the micromotor connected. When the micromotor is disconnected, M1, M2, and M3 will represent the Root Canal Measurement modes, not the Root Canal Preparation modes. Refer to the operation manual for Canal Measurement Module.

⚠ **NOTE**

- ***Each memory has its own unique settings.***

Apical Line

Use this line as an estimate of the root canal's working length. It is set anywhere between 2 and Apex. The file automatically stops and reverses its rotation when the file tip reaches this line (Auto Apical Reverse function). A continuous beep will also sound when the file reverses its rotation.

* Use this line as an estimate for a root canal length measurement.

Torque Settings

⚠ **NOTE**

- ***The torque settings must be changed depending on the root canal condition.***
- ***When the torque is set on the torque line 10 or 11, the file could be engaged in the root canal wall and lock up. When this happens, set the micromotor for reverse rotation (see page 21, "2. Reverse Rotation") to free the file.***
- ***When the Auto Torque Reverse function is turned off, the file could be engaged in the root canal and lock up. When this happens, set the micromotor for reverse rotation (see page 21, "2. Reverse Rotation") to free the file.***
- ***When the Auto Torque Reverse seems to be triggered too frequently, increase the torque setting by one line.***

Setting and Changing Memory

Use the Mode Switch to select M1, M2 or M3. Use the Select switch to select rotation speed, Torque Line or Apical Line. Use the Set Switch to set the memory contents.

MODE Press Mode to select the memory.		SELECT Press (The display will briefly flash on and off.) Select the function	SET Press Set the memory content.
M1 (memory 1)	Root Canal Preparation Mode 1	Torque Line selected. → TORQUE Flashes	Set Torque Line.
M2 (memory 2)	Root Canal Preparation Mode 2	Apical Line selected. → 2 1 APEX Flashes	Apical Line The apical line can be set between 2 and APEX.
M3 (memory 3)	Root Canal Preparation Mode 3	Rotation Speed. **400 rpm**	400 rpm Speed can be set for 0, 150, 200, 250, 300, 400, 500, 600 and 800 rpm.
No display	Root canal measurement mode		

* Speed settings for the TR-400 handpiece (option) are 0, 50, 100, 150, 200, 250, 300, 350 and 400.

* All memory settings will be retained even after the unit is turned off. Simply select M1, M2, or M3 to use those memory settings. If the micromotor is connected, M1 will be selected when the unit is turned on. (If the micromotor is not connected, the memory selected will be the same as when the unit was turned off.)

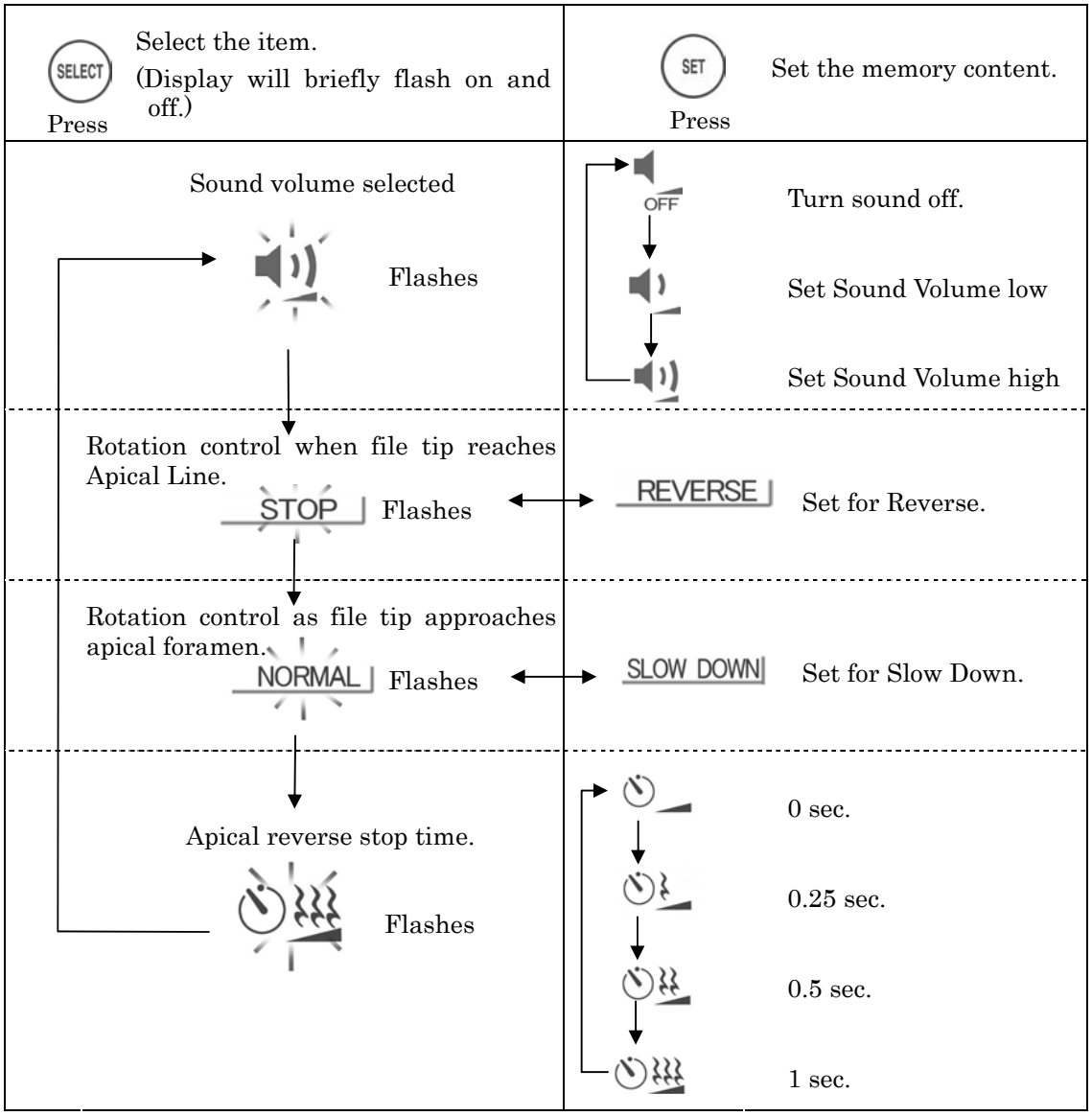
* If the memory display does not appear, the unit is set for root canal measurement.

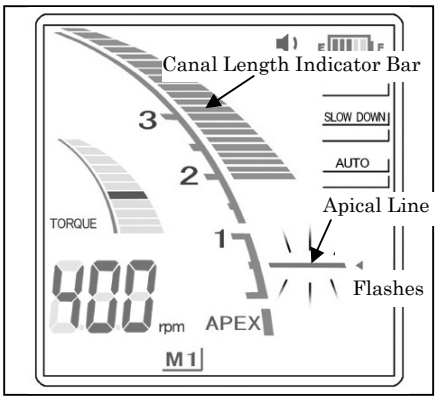
⚠ **WARNING**

- ***Check the settings on the display after selecting memories.***

Setting Memories for Other Functions

1. Turn the power off.
2. Press the Select switch and turn the power back on without releasing the Select switch.
3. Release the Select switch and press the Mode switch to select M1, M2, or M3.
4. Press the Select switch 4 times to pass the Torque Line, Apical Line and Speed settings.
5. Press Set switch to enter the settings into the memory.





Meter Display

* The position of the file tip is shown by the canal length indicator bar on the display. The apical line flashes on and off once file is inserted into the root canal.

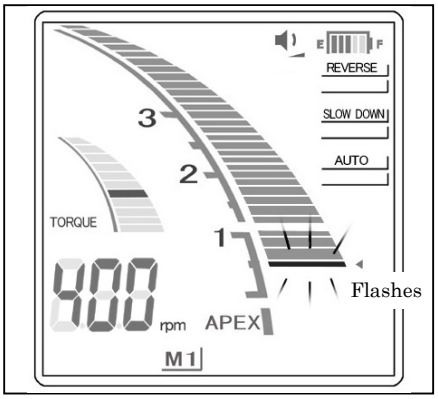
⚠ NOTE

- ***Occasionally the canal length indicator bar makes a sudden and large movement as soon as the file is inserted into the root canal, but it will return to normal as the file is advanced down towards the apex.***

⚠ WARNING

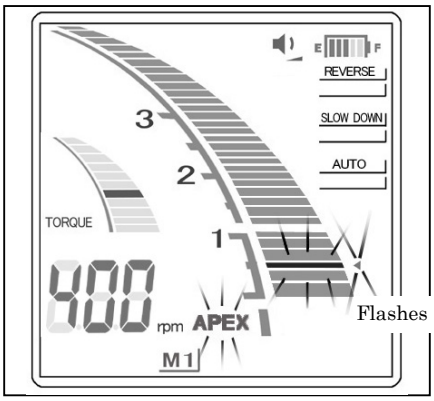
- ***In some cases such as a blocked root canal, a measurement can not be made.***
- ***Accurate measurement is not always possible, especially in cases of abnormal or unusual root canal morphology; make sure to take an x-ray to check the measurement results.***
- ***Stop using the unit immediately if it does not seem to be working properly.***

* ***Refer to the separate manual for the root canal measurement unit (Canal Measurement Module) for instructions on how to measure a root canal.***

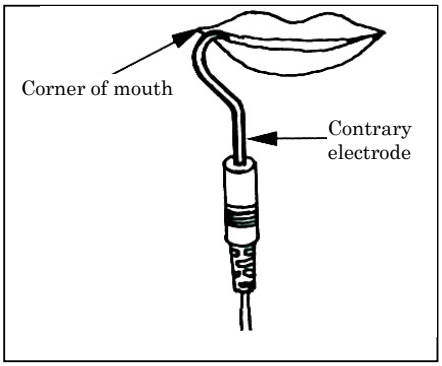


- The meter's 0.5 reading indicates that the tip of the file is in the apical constriction.

* The numerals on the meter gauge do not represent length in millimeters.



- If the file tip passes the point indicated by the apical line, the alarm sound will change from beeping to solid tone. If the file tip reaches the major foramen, the word "APEX" and the triangle next to the apical line will start to flash.

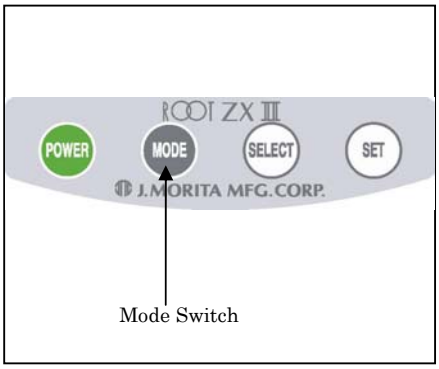


Operating the Micromotor

1. Turn the unit on.
2. Hook the contrary electrode in the corner of the patient's mouth.

⚠ NOTE

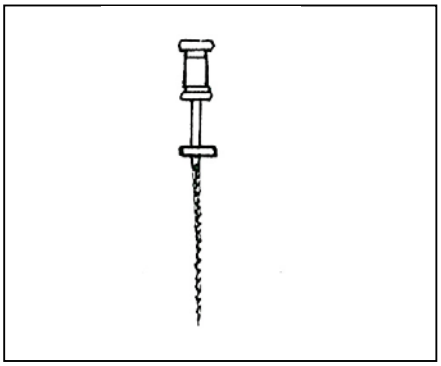
- *The contrary electrode could cause an adverse reaction if the patient has an allergy to metals. Ask the patient about this before using the contrary electrode.*
- *Take care that medicinal solutions such as formalin cresol (FC) or sodium hypochlorite do not get on the contrary electrode or the file holder. These could cause an adverse reaction such as inflammation.*



3. Press the Mode switch and select M1, M2, or M3.

* See page 15 for how to set the memory contents.

* During actual root canal preparation, none of the switches except the Power switch will work.



* Before using the micromotor, use a small file, such as #10 or #15, to penetrate the root canal manually down to the apex and then return to the apical constriction.

4. The file will automatically start to rotate when it is inserted into the root canal (Auto Start). If the root canal is extremely dry, the Auto Start function may not operate.

⚠ NOTE

- *If the Auto Start function does not operate because the root canal is extremely dry, moisten the root canal with a liquid such as hydrogen peroxide, sodium hypochlorite or saline solution. Do not let the liquid overflow from the root canal opening.*
- *Applying excessive force could cause the file to be engaged in the root canal wall and lock up.*

5. If the unit is set for Auto Apical reverse, the file will stop and reverse its rotation when the file tip reaches the point specified by the reverse position setting (Auto Apical Reverse). Or if it is set for Apical Stop, the file will stop when the file tip reaches the point specified by reverse position setting. A single sustained beep will sound when this happens.

6. If more than the specified amount of the torque is applied to the file, the file will automatically reverse its rotation (Auto Torque Reverse). A three-toned alarm will sound when this happens.

* Motor Overheating

To protect the unit from serious internal damage, the micromotor stops running if the temperature inside the motor exceeds about 125°C (257°F). In this case, the entire display flashes on and off. The micromotor will not resume until the temperature inside the motor cools down to about 100°C (212°F).

⚠ WARNING

- ***If the motor overheats, remove the micromotor from the patient's mouth, wait until it cools down to resume treatment.***

⚠ NOTE

- ***The motor may overheat if an excessive force is applied.***
- ***If the motor overheats, do not detach the micromotor from the handpiece cord.***
- ***Even if the motor has cooled down enough to operate, it could still be rather hot and excessive force should not be applied to it.***

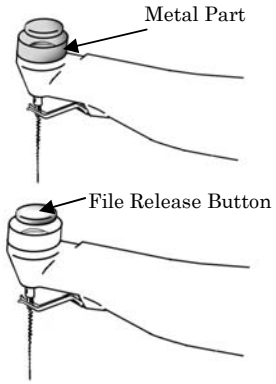
* While an overheated motor is cooling down, the power cannot be turned off. "O.H." appears in the display and the unit can not be turned off even with pressing the Power switch. The unit will automatically turn off after the motor has cooled down. Simply press the Power switch to turn it back on.

7. The file will stop to rotate when it is removed from the root canal (Auto Stop). Gradually increase the size of the file until the root canal preparation is completed.

8. If necessary, prepare the apical seat.

⚠ WARNING

- *Electric noise could cause malfunction of the unit. Do not depend entirely on the unit controlling itself; always watch the display, listen to the sound and be aware of tactile feedback.*
- *Accurate measurement is not always possible depending on the root canal condition. Make sure to take an x-ray to check the results. Also Nickel-Titanium files can sometimes wear out rather quickly depending on the shape and the degree of curvature of the root canal. Stop using the unit immediately if it does not seem to be working properly.*
- *When shaping and cleaning a root canal, make sure that the file or contrary electrode does not come in contact with an electrical power source such as an electrical socket. This could result in a severe electrical shock.*
- *Nickel-Titanium files are more easily broken than stainless steel files by the amount of torque applied to them. Do not try to force the file down the root canal. Also do not use these files for the root canals that have a relatively sharp curve near the apical foramen.*
- *Nickel-Titanium files will eventually break due to metal fatigue and should be replaced before they reach this point.*
- *Always examine files for separation and other deformities or damage before using them. Any type of deformity could result in the file breaking.*
- *If the file touches the oral mucosa or a tooth, it will automatically start to rotate and could injure the patient.*



- *Do not touch the oral mucosa with the metal part at the end of the contra angle. This could result in injuring the patient.*
- *If the contra angle's file release button is pressed against the teeth opposite the one being treated, the file could come out and injure the patient.*
- *Never press the file release button while the micromotor is running. This could cause the button to heat up and burn the patient or the file to come out and injure the patient.*

⚠ NOTE

- *Root canal preparation cannot be performed entirely with this unit; use this unit in conjunction with standard manual techniques for root canal preparation. Stop using the unit immediately if tactile sensation indicates an unusual or abnormal condition inside the root canal.*
- *Files break more easily at high speeds; always check the rotation speed setting before using the unit.*
- *Do not use stainless steel files. Use only Nickel-Titanium files. The file electrode cannot be attached to the following types of Nickel-Titanium files:*
  - *Files with a diameter greater than 1.2 mm*
  - *Files which do not have circular handles*
  - *Gates-Glidden Drills*
  - *Cutting tools with large bits such as a Largo burr*

  Use the above types of tools by putting the unit in manual mode without attaching the file electrode.
- *Make sure to remove the file from the micromotor after completing root canal preparation.*
- *Electrical noise will cause the motor to stop and automatically put the unit into the root canal measurement mode, which is the safest mode. However, it will return to normal operation when the file is taken out of the root canal.*

* The file electrode must be clipped onto the file for accurate measurement and instrument control. (In some cases, a root canal cannot be measured because of an overflow of blood, saliva or chemicals or because the root canal is blocked.)

* For difficulty to reach areas, such as maxillary molars, it may be easier to insert the file into the root canal before activating the micromotor power; remove the contrary electrode from the patient's mouth and then insert the file. Then hook the contrary electrode back in the corner of the patient's mouth to start the file rotating.

⚠ NOTE

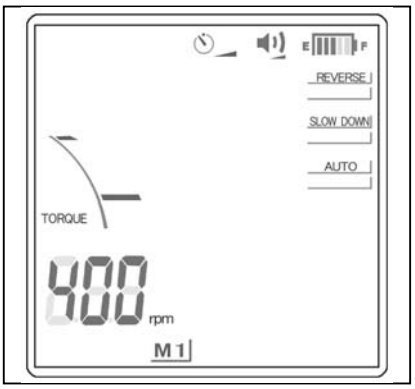
Nickel-Titanium files are more easily broken than stainless steel files by the amount of torque applied to them. Keep the following points in mind to minimize the possibility of file breakage.

- *Before using micromotor, use a small hand file, such as #10 or #15, to penetrate the root canal manually down apex and then return to the apical constriction.*
- *All foreign matter, such as bits of cotton, should be removed from the root canal before using the file.*
- *Never use excessive force to insert or advance the file down the root canal.*
- *Do not use the files in the root canals that have high degree of curvature.*
- *Try not to trigger the Auto Torque Reverse function when advancing the file down the root canal.*
- *The recommended technique for shaping and cleaning the root canal is crown down technique. When using this technique, follow the file manufacturer's guideline.*
- *If you encounter resistance or the Auto Torque Reverse is triggered, back the file up 3 or 4 mm and carefully advance it down the root canal again. Or replace the file with a smaller size. Never use excessive force.*
- *Do not force the file down the root canal or press it against the root canal wall as it could break the file.*
- *Do not use the same file continuously for more than 10 seconds in one position as it may create "steps" on the root canal wall.*

* Washing the root canal out with a chemical solution during instrumentation helps stable and consistent file action.

* After root canal preparation, clean the root canal out ultrasonically.

* If necessary, make minor alterations to fit the of Gutta-Percha point.



<u>Manual Mode Using the Foot Switch</u>

The file can be rotated outside the root canal at the speed set for M1, M2, or M3 by stepping on the foot switch. In this case, the canal length indicator bar in the display will disappear.

The canal length indicator bar will reappear if the file is inserted into a root canal while it is rotating, and the unit will operate normally.

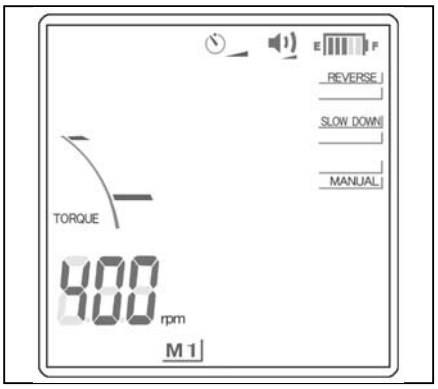
Releasing the foot switch while the file is in the root canal will not stop the file rotation.

⚠ WARNING

- *Be careful when using the foot switch; the motor may rotate regardless of the measurement results.*

⚠ NOTE

- *Be careful using the foot switch because the motor will run when you step on it even if the unit is not measuring the root canal for some reason: for example if the contrary electrode is not hooked in the patient's mouth or the file electrode is not clipped to the file.*
- *Be careful using the foot switch if the measurement display does not appear, such as when measuring an extremely dry canal, because the motor will run even if a measurement is not being made.*
- *If the Auto Torque Reverse function is triggered when the micromotor is running in manual mode with the foot switch, releasing the foot switch while the file is in the root canal will not stop the file rotation until the torque applied to the file goes below preset torque reverse setting.*



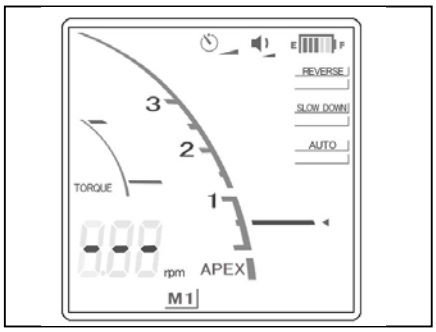
Manual Mode Using the Operation Switches

1. Forward Rotation

When the motor stops and the file is outside the root canal, press the Mode switch while holding down the Set switch. (Do not reverse the switch order; this would change the memory.) The file will rotate in forward direction at the specified speed. The canal length indicator bar on the display will disappear and the indicator, "AUTO" will change to "MANUAL". The canal length indicator bar will reappear if the file is inserted into the root canal while it is rotating, and the unit will operate normally. (The Auto Torque Reverse will be triggered as usual if too much torque is applied.) Press the Set switch to turn the motor off and return to Auto mode.

⚠ NOTE

- ***Be careful pressing switches because the motor could start up even if the unit is not measuring the root canal for some reason: for example if the contrary electrode is not hooked in the patient's mouth or the file electrode is not clipped onto the file.***
- ***Be careful pressing switches if the measurement display does not appear, such as when measuring an extremely dry canal, because the motor could start up even if a measurement is not being made.***



2. Reverse Rotation (to release locked file)

If the motor stops because the file is locked inside the root canal, press the Select switch while holding down the Set switch. (Do not reverse the switch order; this could change the memory.) The file will rotate in reverse direction at the maximum speed for about 0.5 seconds and then slow down to normal speed. The speed shown in the display will briefly change to three dashes [---] and then return to normal. This function is effective for releasing the locked file. Press the Set switch to stop reverse rotation.

⚠ NOTE

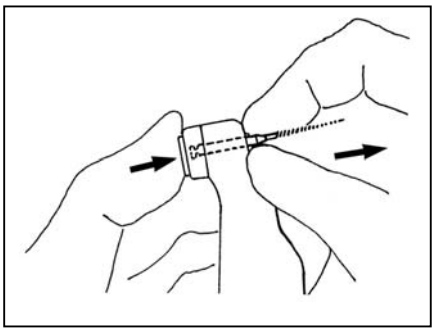
- ***Use the reverse rotation mode carefully. Since it is designed to release the locked file, its rotation is quite fast and powerful, and may easily break the file.***

* Motor Lock

When the file is engaged too deeply in the root canal, the motor stops and the file can no longer rotate. After about 2 seconds the lock on the motor is automatically released and the motor restarts. If this function does not work, detach the contrary electrode and run the motor to reverse the file, or turn the unit off and remove the file manually.

6. After Using the Unit

1. Turn the unit off after use.
   * The unit automatically turns off after 5 minutes of non-use.



2. Unclip the file electrode.

   Hold down the file release button on the contra angle and pull the file straight out.

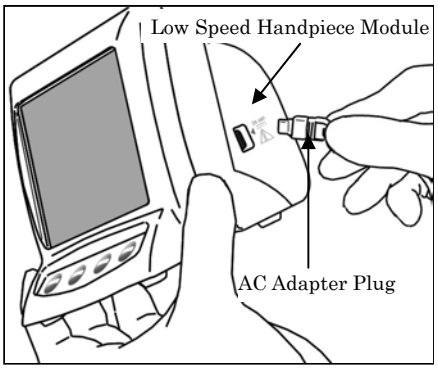
⚠ NOTE

- *Use caution when inserting and removing files to avoid injury to fingers.*
- *Inserting and removing files without holding down the file release button will damage the internal contra angle mechanism.*

3. Disconnect the handpiece cord, contrary electrode and foot switch.

⚠ NOTE

- *When disconnecting and connecting the handpiece cord, contrary electrode and foot switch, never pull or push on the cords themselves; always grip the connectors.*



Charging Battery

The battery is built into Low Speed Handpiece Module. Recharge it as soon as the battery power indicator gets down to 2 lines.

⚠ NOTE

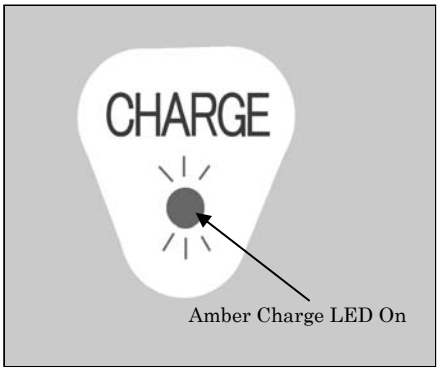
- *Never use the unit when the battery power display is flashing. The motor does not operate when the display is flashing.*
- *If [Lo.b] appears in the speed display, stop using the unit immediately and recharge the battery.*
- *If the plug for the AC adapter does not fit the socket, it is the user's responsibility to find a suitable plug adapter.*

* When the power indicator for the battery goes down to one line, the micromotor will no longer start up, but it will not stop running if it is being used. Turn the power off and charge the battery.

1. Line up the arrow (➡) on the AC adapter's connector with the triangle (◀) above its jack on the left side of Low Speed Handpiece Module and plug it in. Then plug the adapter into the electrical power receptacle.

⚠ WARNING

- *Do not use the unit when the AC adapter is connected.*



2. The Amber Charge LED on the back of Low Speed Handpiece Module starts flashing on and off and then, after a few seconds, it will stop flashing and stay on to show that the battery is being charged. It takes about 60 minutes to fully charge the battery.

⚠ WARNING

- *If [F.02] appears in the display, noise has been detected. Turn the unit off and then back on again. If [F.02] still appears, stop using the unit and contact your local dealer or the J. Morita regional office.*

3. Amber Charge LED goes out when the battery is fully charged.
4. Disconnect the AC adapter from Low Speed Handpiece Module and unplug it.

⚠ WARNING

- *Never operate the unit with an external power supply.*
- *If an electrical storm occurs while the battery is being charged, do not touch the AC adapter or the charger's power supply cord as there would be a risk receiving an electric shock.*

⚠ NOTE

- *Do not pull or yank the cord when disconnecting the AC adapter.*

* For Optimum Battery Performance

1. The battery may lose its ability to hold a charge for the normal length of time if it has not been used for a long time or if it is recharged before each use. [This is due to its deactivation (dull charging response) or to what is called the "memory effect".]

   Its normal working condition can be restored in the following way:

   i Use the manual mode to run the motor until "Lo.b" (low battery) appears in the display and the motor stops running so that the battery is completely discharged.
   ii Connect the AC adapter and recharge the battery in the normal way.
   iii Repeat this process (steps i and ii above) two or three times.
2. It's possible that a newly purchased battery will require the charging procedure described above before it will hold a charge for a normal length of time.
3. Ambient (room) temperature for charging is from 10 to 40 degrees centigrade.

* Sometimes the battery may recharge more quickly than usual. If the time it takes for recharging the battery seems too short, recharge it a second time just in case.

* If the battery has not been used for a week or more, it will have lost its charge and need to be recharged.

7. Sterilization, Replacement Parts and Storage

(1) Sterilization

a. Autoclavable Components

- **Contra Angle and Handpiece Rest**

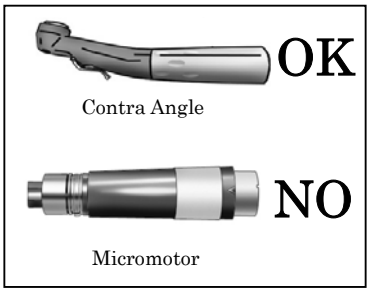
  Recommended temperature and time: 135°C / 275°F, 5 minutes minimum with a sterilization pouch. Minimum drying time after sterilization: 10 minutes.

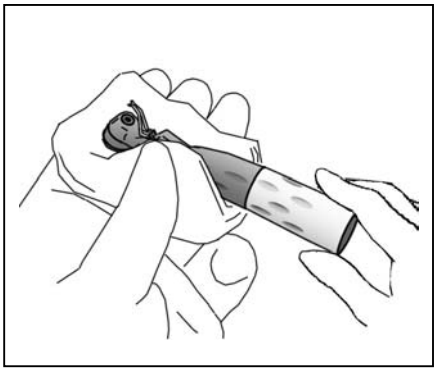
⚠ WARNING

- *Autoclave the contra angle after each patient.*

⚠ NOTE

- *Do not sterilize in any way other than autoclave.*
- *Thoroughly clean and wash the components before autoclaving. If chemical solutions or foreign debris are not removed, autoclaving could damage or deform the components.*
- *Autoclave and dryer temperatures must not exceed 135°C / 275°F.*
- *It is highly recommended to put the contents in a sterilization pouch for autoclaving.*
- *Never autoclave micromotor and handpiece cord.*
- *Remove file before autoclaving contra angle.*





Autoclaving Contra Angle

1. Wipe the contra angle with a piece of gauze dampened with ethanol.
2. Put the contra angle in a sterilization pouch and autoclave it.

⚠ NOTE

- *Never clean the contra angle or the micromotor with chemicals such as formalin cresol (FC) and sodium hypochlorite; these will damage the plastic parts of the components. Immediately wipe away any chemicals that are accidentally spilled on these components.*
- *Never use any type of alcohol other than ethanol.*

b. Non-Autoclavable Components

- **Micromotor and Handpiece Cord**

* Wipe these components with a piece of gauze dampened with ethanol.

⚠ NOTE

- *Never wipe the micromotor and handpiece cord with any type of alcohol other than ethanol.*

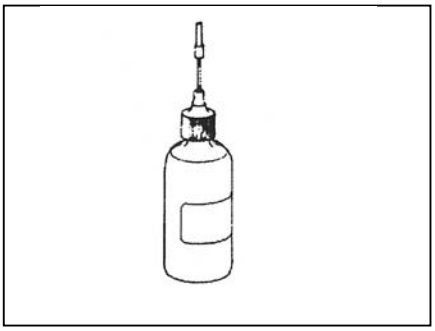
c. Low Speed Handpiece Module, AC Adapter and Foot Switch

* To clean the surfaces of Low Speed Handpiece Module, AC adapter and foot switch, use a soft cloth to apply a little neutral detergent and then rinse it with a cloth moistened with water.

⚠ NOTE

- *Never use any type of alcohol except ethanol. Do not use paint thinner, benzine or similar solutions to clean Low Speed Handpiece Module, AC adapter and foot switch.*
- *Avoid spilling chemical solutions used for treatment on Low Speed Handpiece Module. These chemicals could damage, deform or discolor the module. Use extra caution to avoid spilling formalin cresol (FC) and sodium hypochlorite as they are quite strong. Wipe up any chemical spills immediately. (Some chemicals may leave traces even if wiped up immediately).*

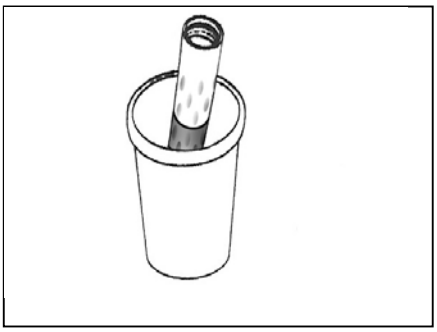
d. Lubricating the Contra Angle



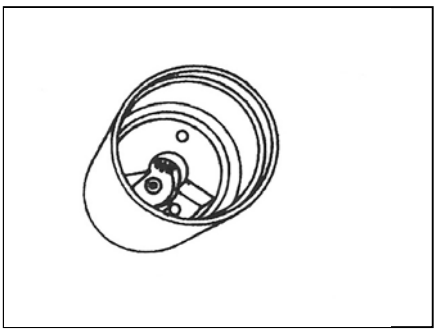
Lubricate the contra angle with AR Oil once a month.

⚠ NOTE

- *When lubricate the contra angle, use only AR oil.*



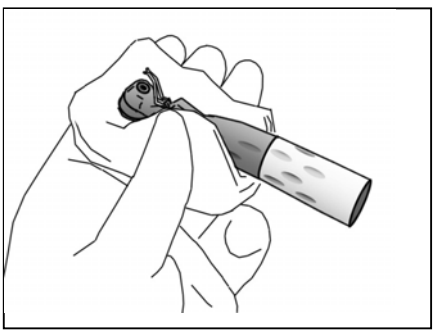
1. Place the contra angle in a paper cup with the connection end facing up.



2. Put 10 drops of AR oil on the gear and wait for 10 minutes.

⚠ NOTE

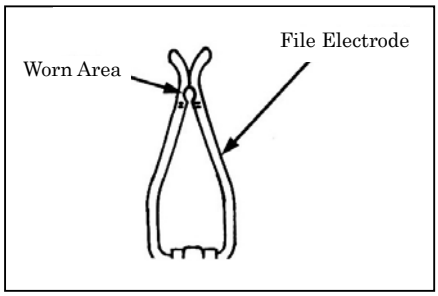
- *Leave the contra angle in a paper cup for at least 10 minutes so that the oil is thoroughly absorbed by the contra angle mechanism.*



3. Take the contra angle out of the paper cup and wipe off any excess oil which may have seeped out.

(2) Replacement Parts

* Replace the parts as necessary depending on degree of wear and length of use.
* Order replacement parts from your local dealer or J. Morita regional office.



Replacing the File Electrode

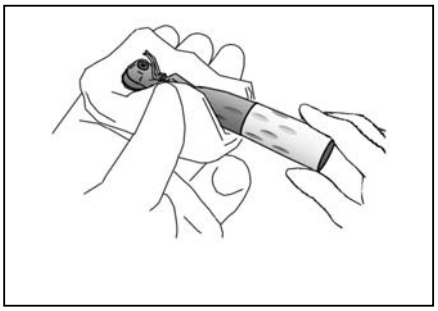
An accurate measurement cannot be made if the file electrode is worn out by prolonged use. Replace it about every 6 months, if it breaks, or if it shows excessive wear.

⚠ WARNING

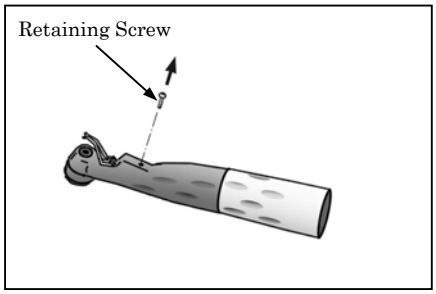
- ***Replace the file electrode when it is worn to the extent indicated in the illustration. It could break if used after reaching this point.***

⚠ NOTE

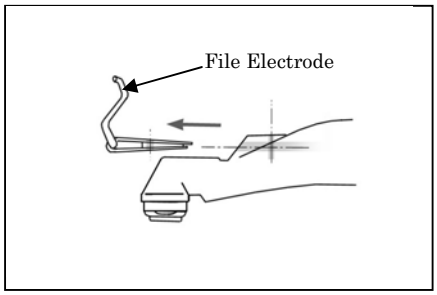
- ***Handle the file electrode carefully.***



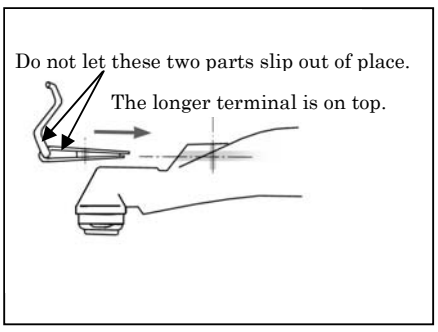
1. Remove the file from the contra angle.
2. Clean the contra angle by wiping it with ethanol. Very carefully clean the area where the electrode clips the file and the small screw which retains it in place.
   * File electrodes for ROOT ZX II Low Speed Handpiece Module can be ordered from your local dealer or J. Morita regional office.



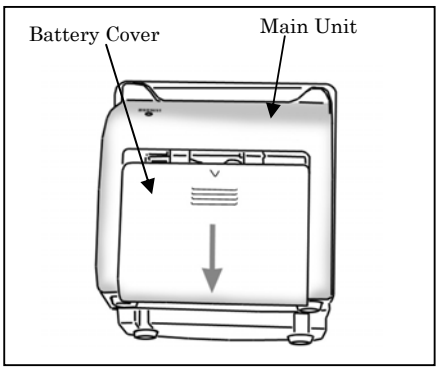
3. Remove the file electrode's retaining screw.
   * This requires a miniature Philips screwdriver.



4. Pull the old file electrode straight out.



5. Position the new file electrode as shown in the illustration and slide it all the way into the attachment hole.
6. Replace the retaining screw and tighten it up.
7. Check that the new file electrode is properly clipped onto a file.



Replacing the Battery

The battery will last for approximately 1 year under normal circumstances and use. Replace it when it starts to loose power relatively quickly after being fully charged.

⚠ **NOTE**

- ***Use only the battery that is specially designed for ROOT ZX II Low Speed Handpiece Module.***

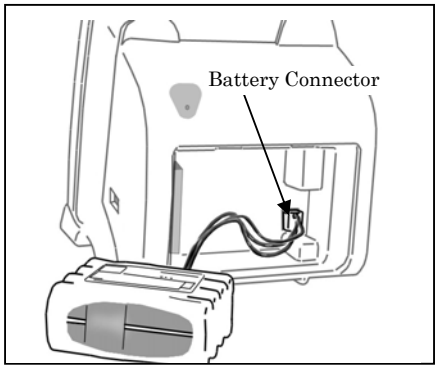
* This battery can be ordered from your local dealer or from J. Morita regional office.

1. Slide the battery cover off the back of Low Speed Handpiece Module in the direction indicated by the arrow in the illustration.

2. Remove the expired battery and disconnect it.

⚠ **NOTE**

- ***Do not leave the power on when disconnecting the battery.***

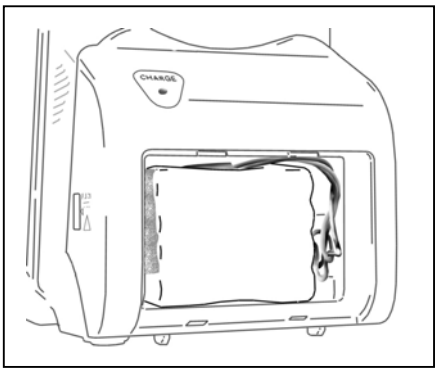


3. Connect the new battery and place it in Low Speed Handpiece Module.

4. Place the battery cover back on Low Speed Handpiece Module.

⚠ **NOTE**

- ***Be careful not to pinch the battery cord when replacing the cover.***
- ***Dispose of old battery in an environmentally safe way and in strict accordance with local regulations.***



(3) Storage

* Store the unit where it will not be exposed to x-rays or direct sunlight and where the ambient temperature range is between -10°C / 14°F and 70°C / 158°F (-10°C / 14°F ~ 45°C / 113°F for battery); humidity between 8 RH % and 80 RH % (without condensation); and atmospheric pressure between 700 hPa and 1,060 hPa.

* If the unit has not been used for a long time, make sure it works properly before using.

* Always remove the battery prior to storing or shipping the unit.

* Working-life

The working-life of this unit is 6 years from the date of shipment provided it is regularly and properly inspected and maintained.

8. Maintenance and Inspection

* The user (hospital, medical institute or clinic) is responsible for inspection and maintenance of the units.)

Regular Inspection

* This unit should be inspected every 6 months in accordance with the following maintenance and inspection items.

Maintenance and Inspection Items

1. Check that the battery does not seem to be losing its charge too quickly.
2. Check that the Mode switch changes the memory from M1 to M2 to M3 etc.
3. Check that the Select and Set switches work properly.
4. Check that the handpiece cord is properly connected to its jack on Low Speed Handpiece Module and that the contrary electrode is properly connected.
5. Check that the connection end of the motor handpiece is clean and not damaged and that it is properly connected to the handpiece cord.
6. Check that the connection end of the contra angle is clean and not damaged and that it is properly connected to the motor handpiece. Also check that the push button works and a file is properly installed. Check that the file electrode clips onto the file properly and is not damaged or worn out.

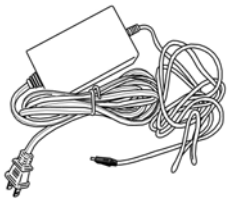
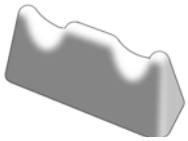
9. Troubleshooting

If the unit does not seem to be working properly, the user should first try to troubleshoot to solve operational problems. If the problems can not be solved after referring to the list below, contact your local dealer or J. Morita regional office.

Problem	Check Points	Responses
No power.	Check battery installation. Check battery power.	Install battery properly. Charge battery.
Cannot make a measurement.	Check handpiece cord connection. Check handpiece cord for broken wire.	Plug handpiece cord securely. Touch the contrary electrode with file; if the meter does not react, there may be a broken wire in the handpiece cord.
No sound.	Check if sound is turned off.	Turn the sound on.
Cannot switch memories Cannot change memory settings	Is a measurement being performed? Is the unit in manual mode? Does the switch work?	Switches do not work during measurement. Memory settings cannot be changed in manual mode. Switch may be broken.
Display does not appear.	Is there a sound when the unit is turned on and off?	Charge battery if there is no sound. Broken display if there is a sound.
Micromotor does not run.	Check if the display is set for root canal preparation or for root canal measurement. Display is OK, but micromotor will not operate. Micromotor handpiece does not operate in manual mode and the overheat indicator [O.H.] appears in the display? Micromotor is not overheated.	Check the handpiece cord connections. Try manual mode. If the micromotor operates in manual mode, the problem is with the unit's root canal measurement ability. Micromotor is overheated. Defective micromotor or handpiece cord.
Micromotor will not go in reverse rotation.	See if it is set for apical stop, instead of Apical Reverse. Setting is OK but micromotor will not go in reverse.	Set the unit for Apical Reverse. Defective PC Board.
Micromotor changes speed on its own.	Is the unit set for Slow Down?	Change the Slow Down setting to Normal.
Micromotor does not stop.	Is the file in a root canal? Micromotor does not stop even if file is out of a root canal. Micromotor keeps running even when it's not in manual mode. Is foot switch depressed? File still keeps rotating.	The file rotation does not stop if the file is in a root canal except when set for Apical Stop. In manual mode, the file rotation does not stop even when the file is out of the root canal. The micromotor will operate in reverse if the contrary electrode and file touch each other. Release foot switch. Defective PC Board.

Problem	Check Points	Responses
Canal length indicator is unstable. Refer to manual for Canal Measurement Module.	Is contrary electrode making good contact with oral mucosa?	Make sure the contrary electrode makes good contact with the oral mucosa.
	Is the file holder dirty?	Clean the file holder with ethanol.
Canal length indicator bar does not move. (except when very near the apical foramen)	Is root canal blocked?	Canal length indicator will return to normal when the file reaches apical constriction.
	Is root canal extremely dry?	Moisten the inside of the root canal with hydrogen peroxide or saline solution.
	Impossible to make a measurement.	Determine the working length by taking an x-ray. Put a rubber stopper on the file and use the unit in manual mode.
	A small file in a large root canal.	Increase the size of the file.
Canal length indicator overreacts or is too sensitive. ・Measurements are too short. ・Poor accuracy. ・Erratic results.	Is blood or saliva overflowing from the opening at the crown?	Blood, saliva or chemical solutions that overflow and leak onto the crown or neck can cause an electrical shortage. Clean away all overflowing fluids.
	Is the root canal filled with blood or chemical solutions?	The canal length indicator bar may suddenly swing when it breaks the surface of fluids inside the root canal, but it will return to normal as it approaches the apex.
	Is the tooth surface covered with cutting debris or chemical solutions?	Clean entire tooth surface.
	Is the file touching the gingival tissue?	This will cause the canal length indicator bar to suddenly jump all the way to “APEX”.
	Is there pulp tissue left inside the root canal?	An accurate measurement cannot be obtained if a large amount of pulp tissue is left inside the root canal.
	Is the file touching a metal prosthesis?	Touching a metal prosthesis with the file allow the current to flow to the gingival tissue or periodontal pocket and will cause the meter to jump to “APEX”.
	Are proximal surfaces infected with caries?	Caries on proximal surfaces can allow the current to flow to the gingival tissue and make it impossible to measure the length of a root canal.
	Are there lateral canals or is the tooth fractured.	The canal length indicator bar may jump to apex when it reaches the opening of a lateral root canal or the opening of a fractured tooth which allows the current to flow to the gingival tissue.
	Does a broken crown allow the leakage of electric current?	Build up an insulating barrier to stop the leakage.
	Is there a lesion at the apex?	A lesion can destroy the apical foramen through absorption and an accurate measurement cannot be obtained.
	Is the file holder broken or dirty?	Replace or clean the file holder.

10. Replacement Parts List

1	2	3
4	5 	6
7	8	9 
10		

No.	Code No.	Description
1		File Electrode
2	7504010	Battery
3	7503800	AR Oil
4	7503955	Contra Angle
5	7504060	AC Adapter (120V)
6	7504003 7504000	Micromotor TR800 Micromotor TR400 (option)
7	7503960	Handpiece Cord
8	7504015	Foot Switch
9	7503965	Handpiece Rest
10		Plastic Sleeve (500)

11. Technical Specifications

Main unit and accessories

Model	DP-ZX
Type	TR-EX

Classification

Safety according to IEC 60601-1, IEC 60601-1-2, UL 2601-1, C-UL, ISO 11498, ISO 7785-2
European Directive 93/42/EEC IIa
Canada Medical devices Class II

WITH RESPECT TO ELECTRIC SHOCK、FIRE MECHANICAL AND OTHER SPECIFIED HAZARDS ONLY IN ACCORDANCE WITH UL 2601-1 AND CAN/CSA C22.2 NO.601.1、MEDICAL EQUIPMENT CERTIFIED FOR CANADA ＜81JK>

Degree of Protection against Electric Shock	Type B applied part
Degree of Protection (IEC 60529)	IPX O
Mode of Operation	Continuous

Intended use

It can be used to shape root canals while monitoring the position of the file tip inside the root canal. It can be used to measure the length of the root canal, and it can be used as low speed motorized handpiece.

Main unit

Rated Voltage	DC 9.6 V (with rechargeable battery operation)
Rated Current	max. 0.2 A (with rechargeable battery operation)
Power Consumption	1.92 VA (with rechargeable battery operation)
Rate Input Power	max. DC 17 V, 1.6 A (when AC adapter is connected and the rechargeable battery is charged)
Dimensions	Low Speed Handpiece Module 115 ± 20(mm) x 105 ± 20(mm) x 127 ± 20(mm)
Weight	Low Speed Handpiece Module Approximately 660 g

Free running speed of the micromotor

TR800 motor + DP-ZX contra angle	150 (±50) ~ 800 ± 200 rpm
TR400 motor (option) + DP-ZX contra angle	50 (+50, -20) ~ 400 ± 200 rpm

* Accuracy of the displayed values are ± 20%
After a certain numbers of uses, this accuracy may not be achieved.
The rotation speed will be slower than displayed values.

Rated Torque:

TR800 motor + DP-ZX contra angle	min. 0.020 Nm
TR400 motor (option) + DP-ZX contra angle	min. 0.040 Nm

Handpiece

Micromotor	
Model	TR800 TR400 (option)
Type Classification (Maximum Rotation Speed)	Type 2 (according to ISO 11498)
Rated Motor Input Voltage	max. DC 9.6 V
Rated Current	max. 0.2 A (with rechargeable battery operation)
Power Consumption	1.92 VA (with rechargeable battery operation)
Dimension	max. diameter 18 ± 3(mm) x length 165±20(mm)
Weight	Approximately 70 g
Motor	Miniature Direct Current Motor
Coupling Identification	DP-ZX coupling It can be used with only DP-ZX contra angle.
Mode of Operation	Intermittent
Field Repair	It can not be repaired in the field. Send to J. Morita regional office or local dealer for repair.
DP-ZX Contra Angle	
Model	DP-ZX contra angle
Free Running Maximum Operation Speed	800 rpm or 400 rpm (option)
Minimum Fitting Length of Shank	12.0 mm
Maximum Overall Length of Rotary Instrument	28.0 mm
Type of Shank	Type 1 (according to ISO 1797-1)
Type of Coupling	DP-ZX coupling * It can be used only with DP-ZX micromotor.
Gear Ratio	2.85 : 1
Chuck Type	Push Button Latch

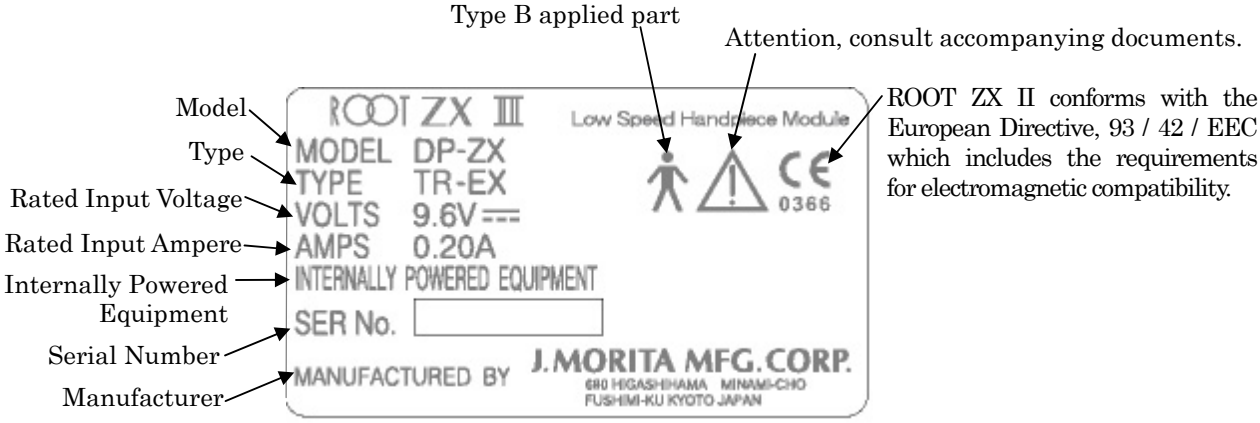
AC adapter

Model	0302-A7A6
Classification	
Safety according to IEC 60950, UL 1950, C-UL Conforms with European directive 89/336/EEC for Electromagnetic compatibility	
Rated Input voltage	AC100 ~ 240
Rated Input current	0.47 ~ 0.25 A
Output	DC 17 V 1.6 A

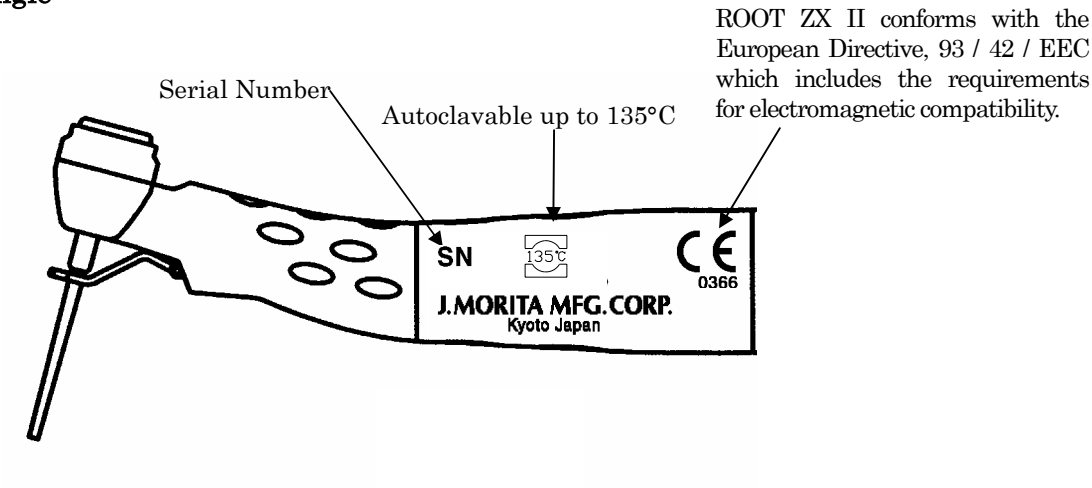
Symbols

Rated Label

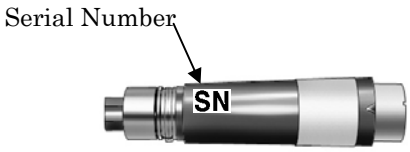
* Distributor on the label is different depending on the market where it is installed.

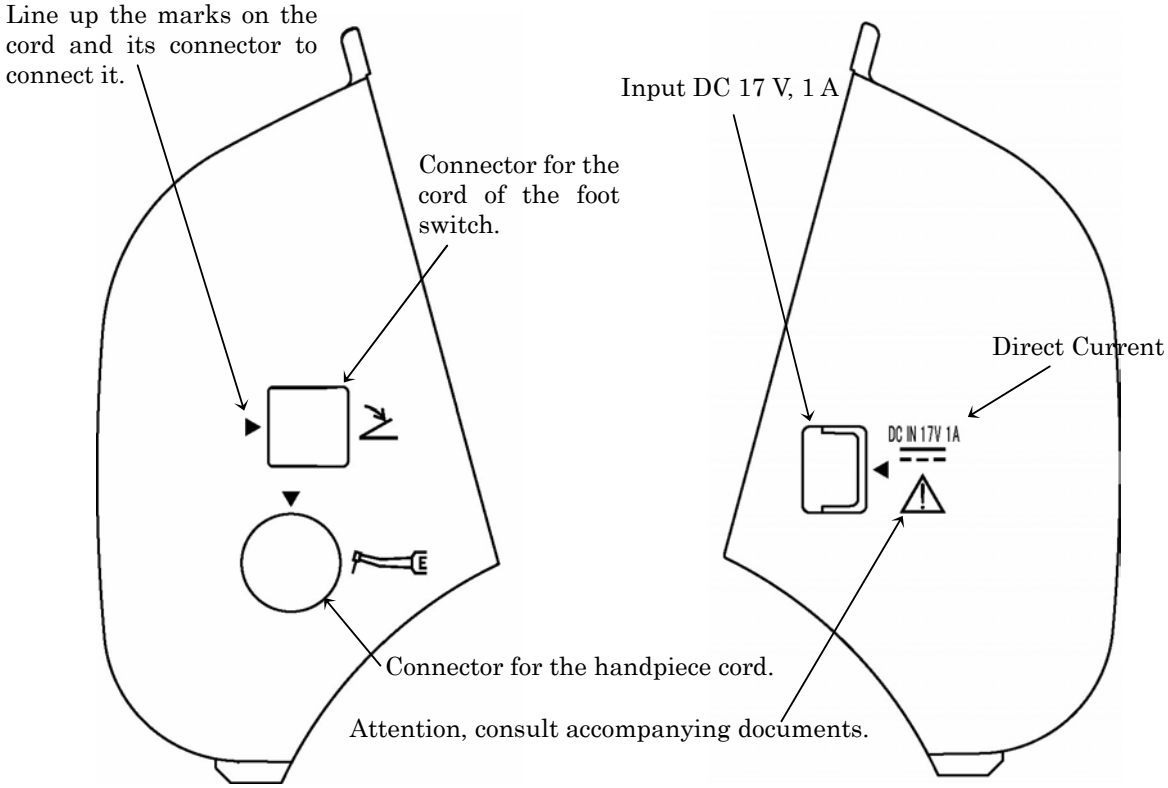


Contra Angle

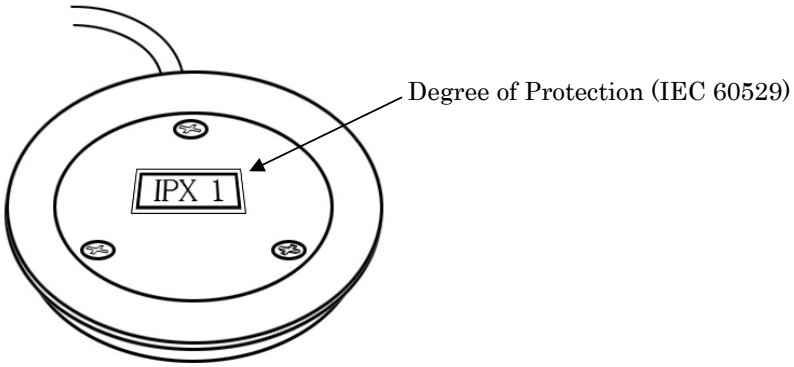

ROOT ZX II conforms with the European Directive, 93 / 42 / EEC which includes the requirements for electromagnetic compatibility.
Serial Number
Autoclavable up to 135°C
SN
135℃
0366
J.MORITA MFG.CORP.
Kyoto Japan

Micromotor

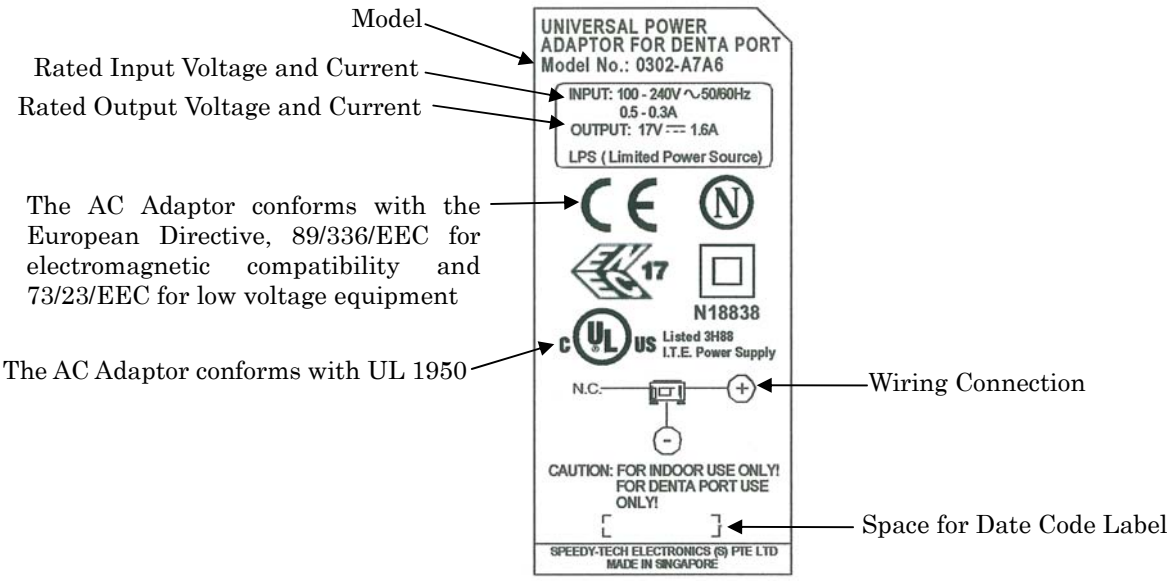



Line up the marks on the cord and its connector to connect it.
Connector for the cord of the foot switch.
Input DC 17 V, 1 A
Direct Current
DC IN 17V 1A
Connector for the handpiece cord.
Attention, consult accompanying documents.

On the back side of the foot switch



AC Adaptor


Model
Rated Input Voltage and Current
Rated Output Voltage and Current
The AC Adaptor conforms with the European Directive, 89/336/EEC for electromagnetic compatibility and 73/23/EEC for low voltage equipment
The AC Adaptor conforms with UL 1950
UNIVERSAL POWER
ADAPTOR FOR DENTA PORT
Model No.: 0302-A7A6
INPUT: 100 - 240V ~50/60Hz
0.5 - 0.3A
OUTPUT: 17V ⎓ 1.6A
LPS (Limited Power Source)
N18838
Listed 3H88
I.T.E. Power Supply
N.C.
CAUTION: FOR INDOOR USE ONLY!
FOR DENTA PORT USE
ONLY!
SPEEDY-TECH ELECTRONICS (S) PTE LTD
MADE IN SINGAPORE
Wiring Connection
Space for Date Code Label

Operation, Transport and Storage Conditions for the main unit and AC adapter

Operating Conditions

Ambient temperature range	+10°C / 50°F ~ +40°C / 104°F
Relative humidity	30 ~ 80 RH % without condensation
Atmospheric pressure range	800 ~ 1,060 hPa

Transport and Storage Conditions

Ambient temperature range	-10°C / -14°F ~ +70°C / 158°F (-10°C / -14°F ~ +45°C / 113°F for battery)
Relative humidity	8 ~ 80 RH %
Atmospheric pressure range	700 ~ 1,060 hPa

Disposal

The rechargeable battery should be recycled. Metal parts of the equipment are disposed as scrap metal. Synthetic materials, electrical components, and printed circuit boards are disposed as electrical scrap. Material must be disposed according to the relevant national legal regulations. Consult specialized disposal companies for this purpose. Please inquire of the local city/community administrations concerning local disposal companies.

Service

ROOT ZX II may be repaired and serviced by

- the technicians of J. Morita's subsidiaries all over the world.
- technicians employed by authorized J. Morita dealers and specially trained by J. Morita.
- independent technicians specially trained and authorized by J. Morita.

12. Warranty

1 Year Limited Warranty

1. The manufacturer gives a worldwide guarantee for one year beginning from the date of purchase. Within this period any defect that is due to faulty manufacturer or material will be remedied by repair or replacement at the judgment of the manufacturer or its distributor.

2. Warranty repair and service: In the event of a claim under this guarantee, the device is to be sent to the service facility of the distributor, **postage and shipping paid**, including a short description of the problem, and a copy of the sales receipt from the dealer as proof of purchase and title to warranty. **Always ship prepaid. Distributor does not accept collect shipments.**

3. In the case of damage caused by wear and tear, careless handling and repairs not carried out by an authorized service facility, the warranty ceases to be valid. This guarantee may not form the bases for any claims for damages, in particular not for compensation of consequential damages.

   The buyer assumes responsibility for damage due to dropping of the unit, improper use and utilization of product and chemicals other than those stated in this instruction manual for cleaning. It is the customer's responsibility to maintain the exact rated voltage indicated at the bottom of the unit, and the office maintains electrical outlets for proper performance of the unit.

4. **This warranty does not include the external accessories, file electrode, batteries, or transportation costs.**

* ATTENTION

1. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from repairs made by personnel not authorized by J. Morita Mfg. Corp.

2. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from any changes, modifications, or alterations of its products.

3 J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from the use of products or equipment made by other manufacturers, except for those procured by J. Morita Mfg. Corp.

4 J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from maintenance or repairs using parts or components other than those specified by J. Morita Mfg. Corp. and in their original condition.

5. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from operating the equipment in ways other than the operating procedures described in this manual or resulting from not following the cautionary remarks and warnings in this manual.

6. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from workplace conditions and environment or installation conditions such as improper electrical power supply which do not conform to those stated in this manual.

7. J. Morita Mfg. Corp. will not be responsible for accidents, equipment damage, or bodily injury resulting from fires, earthquakes, floods, lightning, natural disasters, or acts of God.

8. J. Morita Mfg. Corp. will supply replacement parts and be able to repair the product for a period of 10 years after the manufacture of the product has been discontinued.

* Inspect the unit every 6 months in accordance with the Maintenance and Inspection items on page 28.

* Refer to the parts replacement lists and replace worn parts whenever necessary.

Manufactured by **J. MORITA MFG. CORP.**

680 Higashihama Minami-cho, Fushimi-ku, Kyoto, 612-8533 Japan

J. MORITA CORPORATION

Tokyo Office : 11-15, 2-Chome Ueno, Taito-ku, Tokyo, 110-8513 Japan

Osaka Office : 33-18, 3-Chome Tarumi-cho, Suita, Osaka, 564-8650 Japan

J. MORITA USA INC.

9 Mason

Irvine, CA 92618 U.S.A.

TEL : 1-949-581-9600 FAX : 1-949-465-1095

J. MORITA EUROPE GMBH

Justus-Von-Liebig-Strasse 27A

D-63128 Dietzenbach F.R. GERMANY

TEL : 49-6074-836-0 FAX : 49-6074-836-299

EU Authorized Representative under the European Directive 93/42/EEC

Medical Technology Promedt Consulting GmbH

Altenhofstrasse 80, 66386 St. Ingbert

F.R. GERMANY

TEL : 49 6894 581020 FAX : 49 6894 581021

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"This registration mark does not in any way guarantee the actual quality of this product (service)."

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